-- BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a first protein crystal packing function histogram utilizing the method of the invention and based on providing the number of possible configurations for a given protein or other molecule of interest with a resolution in Angstroms.

FIG. 2 shows a second protein crystal packing function histogram utilizing the method of the invention and based on providing the number of possible configurations for a given protein or other molecule of interest with a resolution in Angstroms.

FIG. 3 shows a flow chart for the calculation routine of the current invention used to resolve the unphased diffraction amplitudes of the SHSB representations of the current invention.

FIG. 4 shows a space filling schematic for a mathematical representation of the orthorhombic space group of the invention.

FIG. 5 shows a flow chart for the calculation routine of the current invention used to resolve the unphased diffraction amplitudes of the SHSB representations into a Fourier Transformation of the model crystal of the molecule of interest utilizing a fractionalization matrix.

FIG. 6 shows a representation of an Expanded Direct Space Basis Function of the invention.

FIG. 7 shows a representation of a Component Direct Space Basis Function of the invention and the Component Fourier Transformations following there from. --

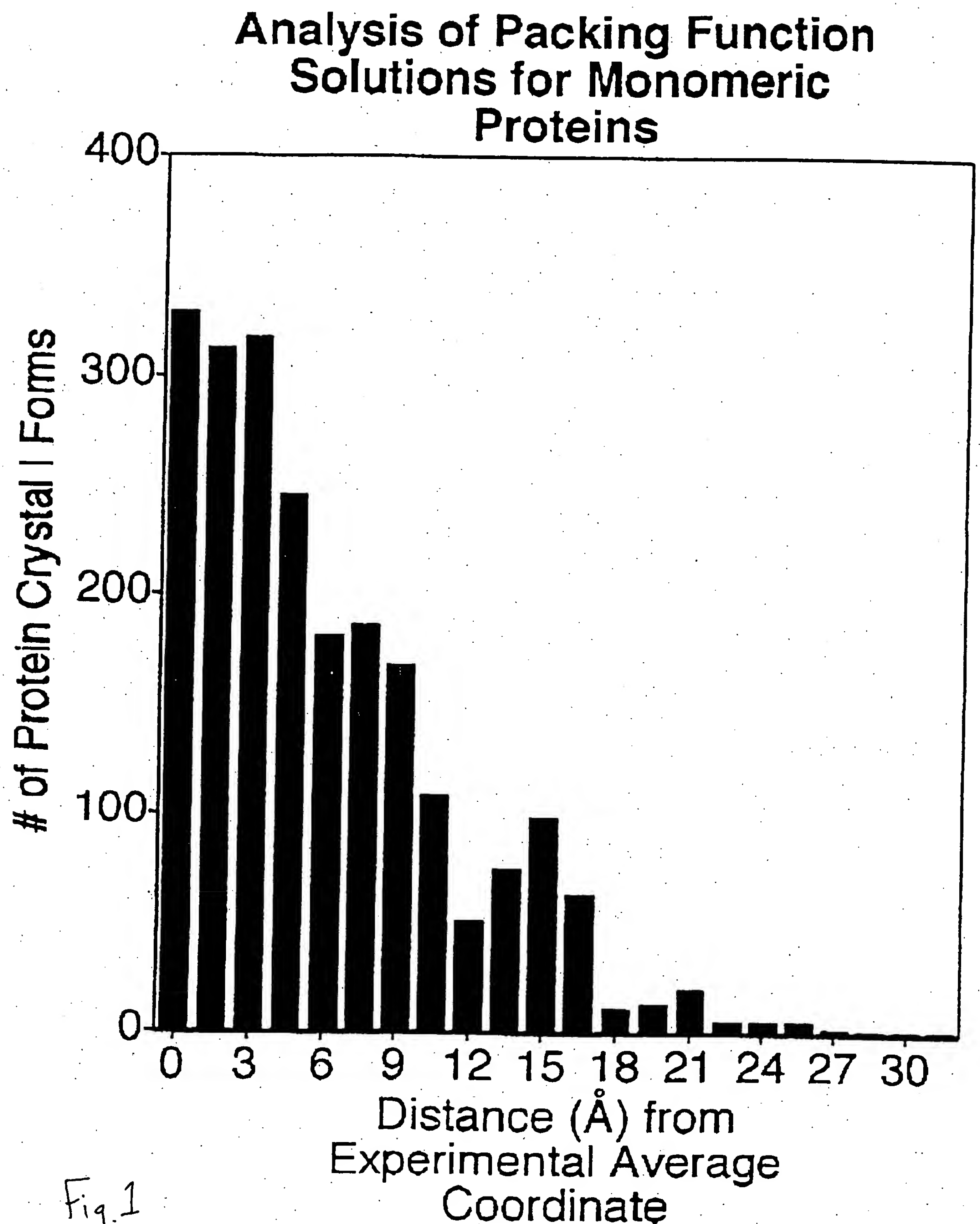

Analysis of Packing Function
Solutions for Monomeric
Proteins
400
300
200
100
0
# of Protein Crystal l Foms
0
3
6
9
12
15
18
21
24
27
30
Distance (Å) from
Experimental Average
Coordinate

Fig. 1

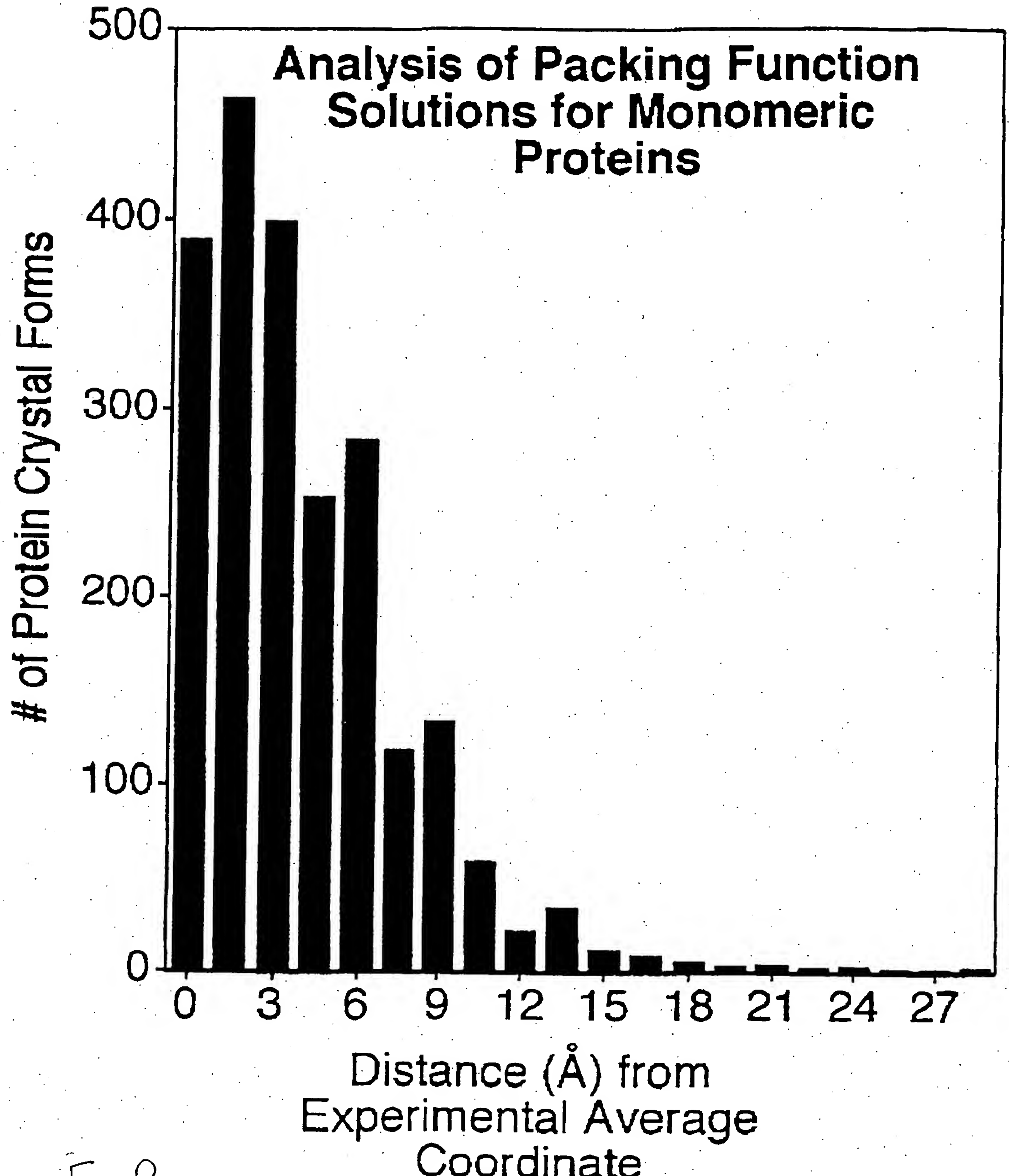

Analysis of Packing Function Solutions for Monomeric Proteins
500
400
300
200
100
0
# of Protein Crystal Forms
0
3
6
9
12
15
18
21
24
27
Distance (Å) from Experimental Average Coordinate

Fig. 2

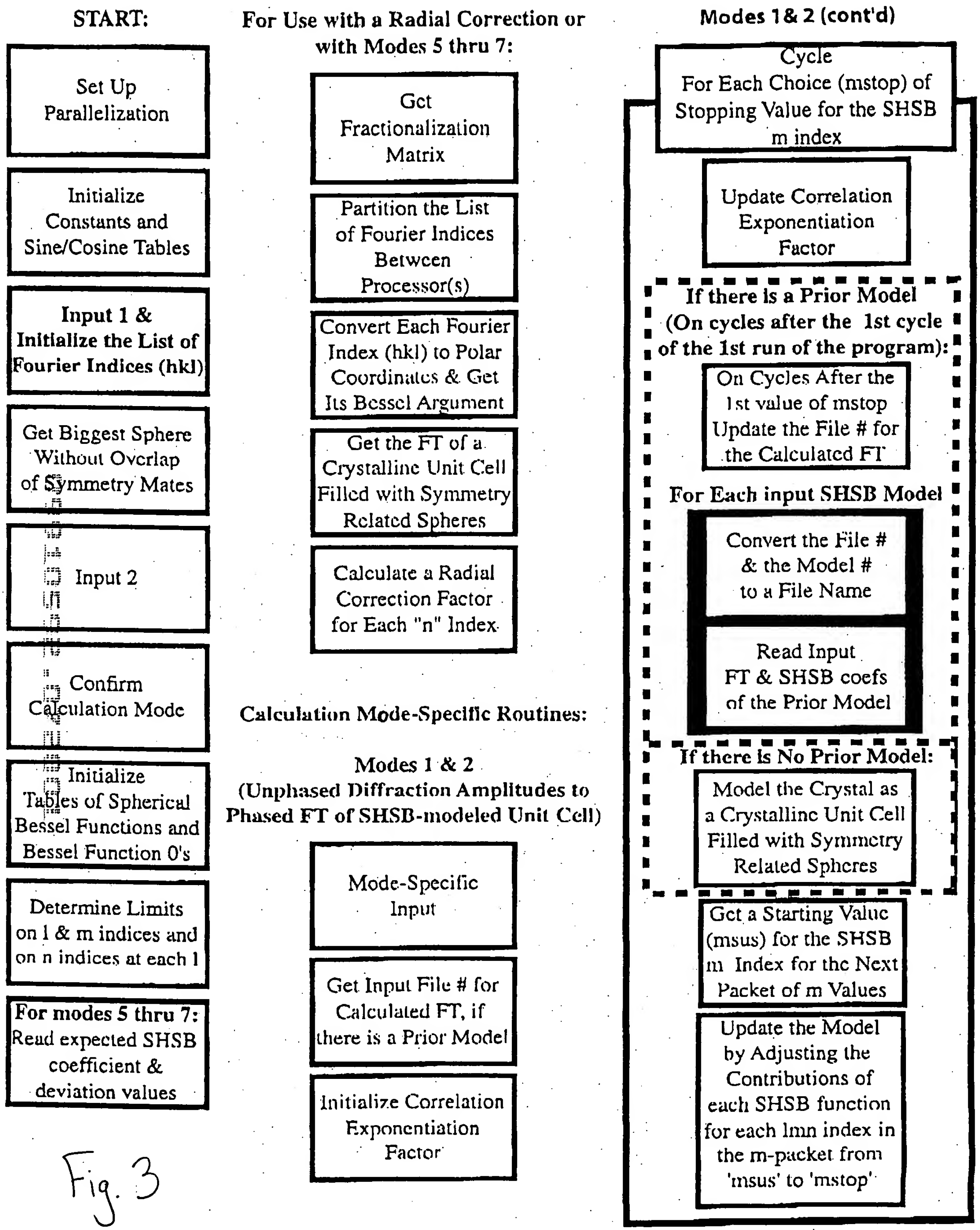


Fig. 3

Flow Chart for the Main Driver Program for "faizer": Options to compute a the FT of a SHSB Model of Crystal

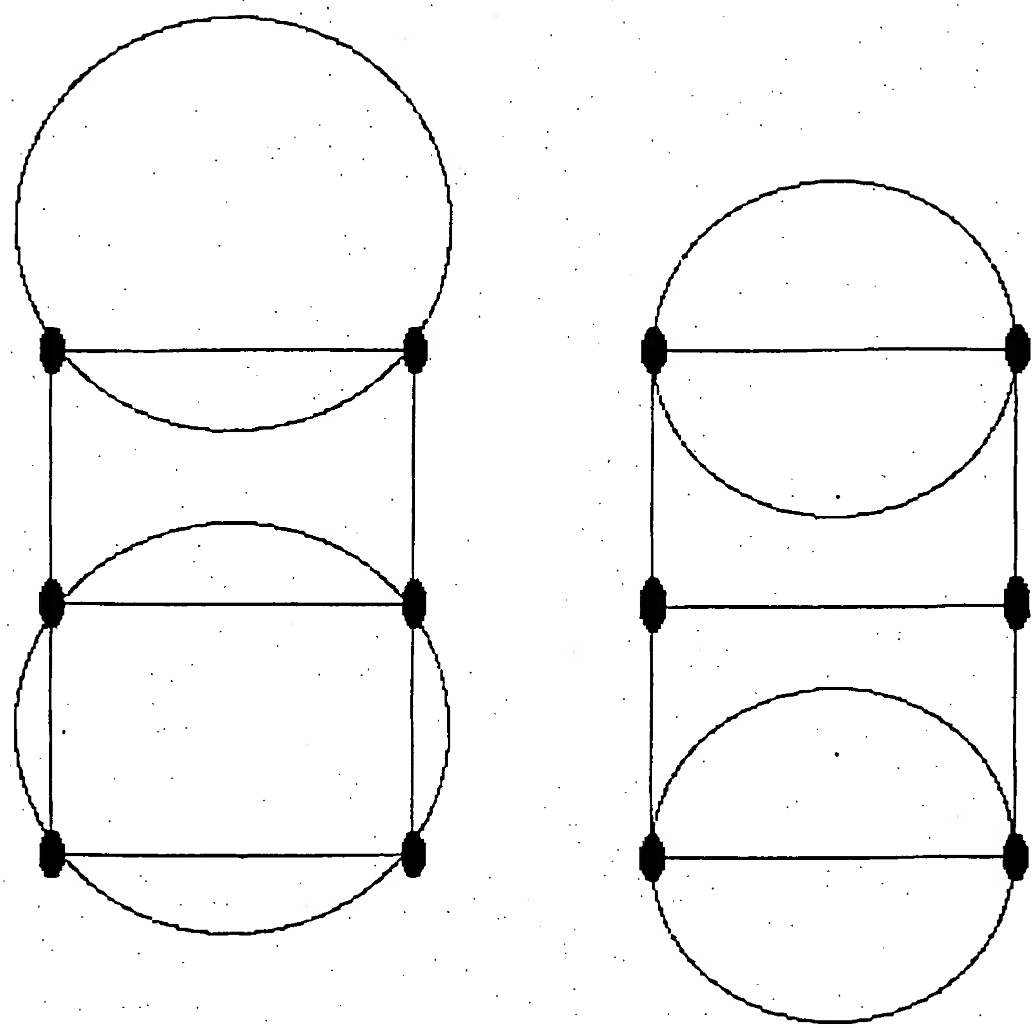


Figure 4 A schematic example: Two choices for filling the same portion of a crystal unit cell from an orthorhombic Spacegroup. Although the spheres on the right are smaller than those on the left, for some crystals, the local maximum in the packing on the right wold be the packing of maximal consistency with the crystallographic data.

Figure 4.

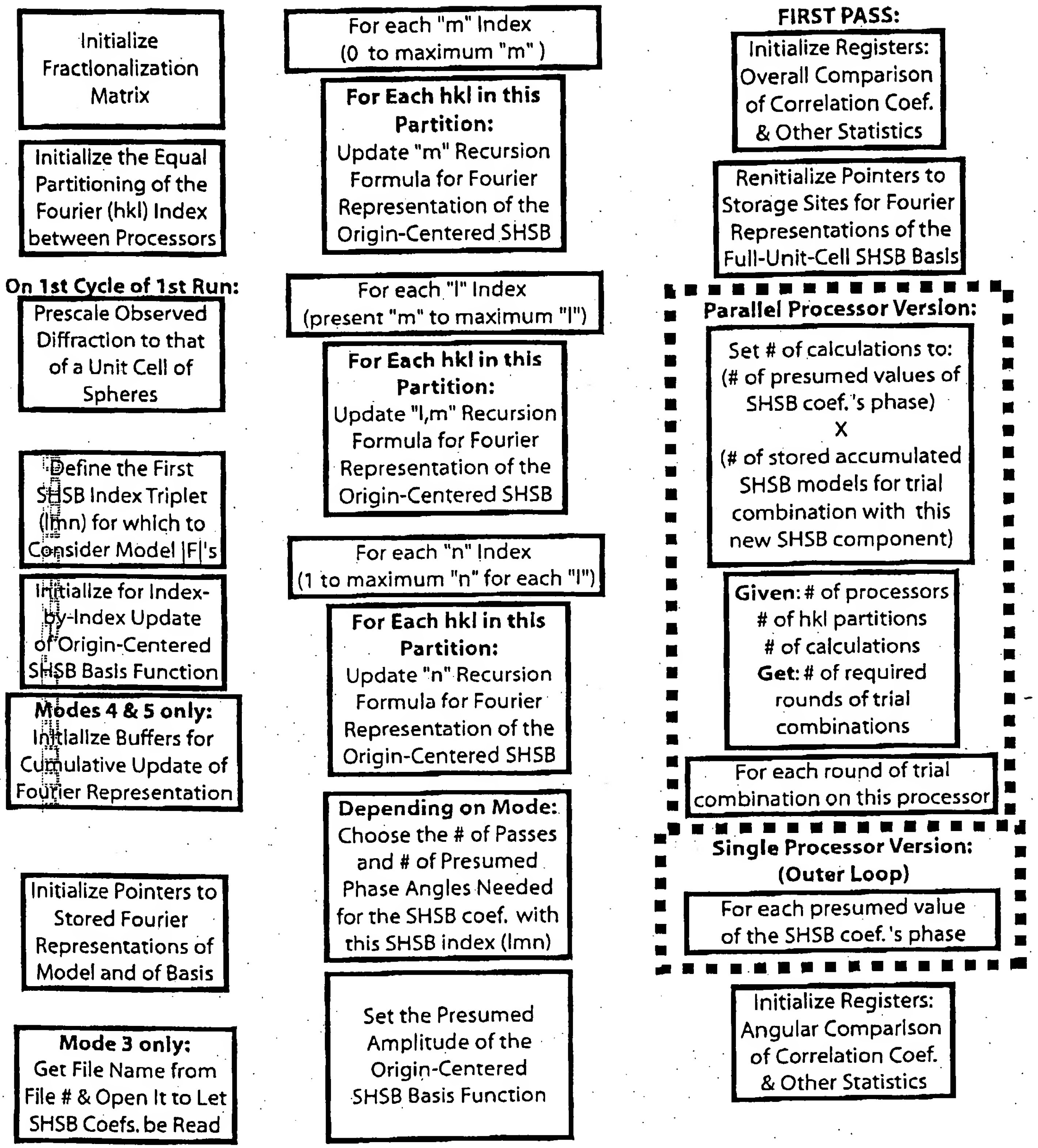
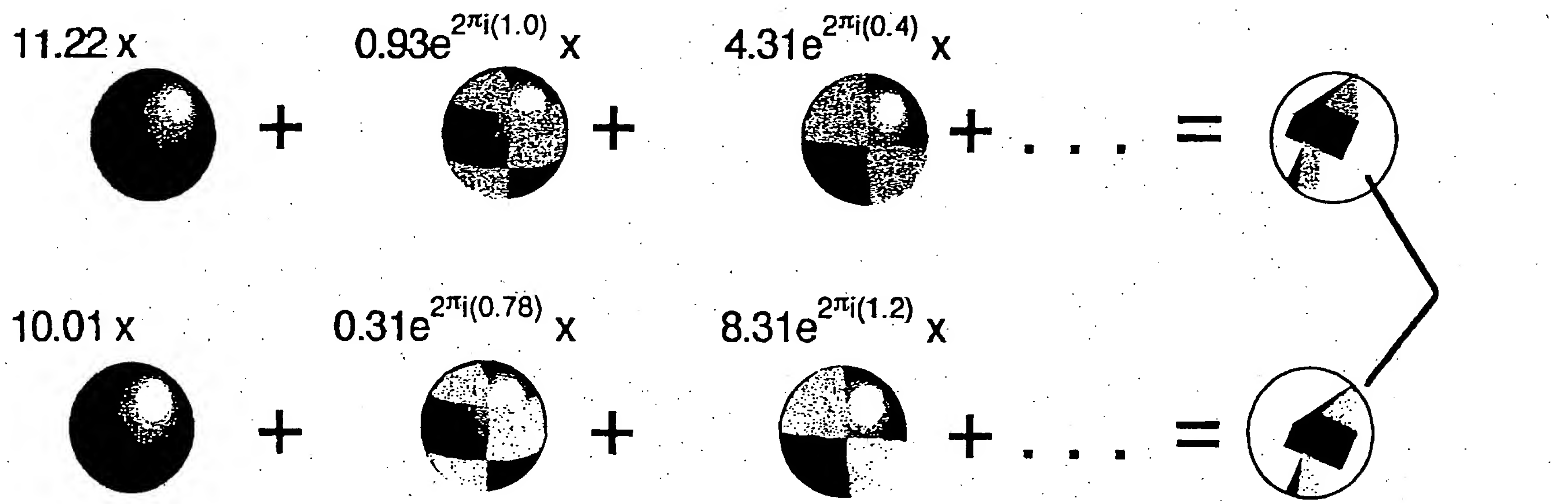

Initialize Fractionalization Matrix
Initialize the Equal Partitioning of the Fourier (hkl) Index between Processors
On 1st Cycle of 1st Run:
Prescale Observed Diffraction to that of a Unit Cell of Spheres
Define the First SHSB Index Triplet (lmn) for which to Consider Model |F|'s
Initialize for Index-by-Index Update of Origin-Centered SHSB Basis Function
Modes 4 & 5 only: Initialize Buffers for Cumulative Update of Fourier Representation
Initialize Pointers to Stored Fourier Representations of Model and of Basis
Mode 3 only: Get File Name from File # & Open It to Let SHSB Coefs. be Read
For each "m" Index (0 to maximum "m")
For Each hkl in this Partition: Update "m" Recursion Formula for Fourier Representation of the Origin-Centered SHSB
For each "l" Index (present "m" to maximum "l")
For Each hkl in this Partition: Update "l,m" Recursion Formula for Fourier Representation of the Origin-Centered SHSB
For each "n" Index (1 to maximum "n" for each "l")
For Each hkl in this Partition: Update "n" Recursion Formula for Fourier Representation of the Origin-Centered SHSB
Depending on Mode: Choose the # of Passes and # of Presumed Phase Angles Needed for the SHSB coef. with this SHSB index (lmn)
Set the Presumed Amplitude of the Origin-Centered SHSB Basis Function
FIRST PASS:
Initialize Registers: Overall Comparison of Correlation Coef. & Other Statistics
Renitialize Pointers to Storage Sites for Fourier Representations of the Full-Unit-Cell SHSB Basis
Parallel Processor Version:
Set # of calculations to: (# of presumed values of SHSB coef.'s phase) X (# of stored accumulated SHSB models for trial combination with this new SHSB component)
Given: # of processors # of hkl partitions # of calculations Get: # of required rounds of trial combinations
For each round of trial combination on this processor
Single Processor Version: (Outer Loop)
For each presumed value of the SHSB coef.'s phase
Initialize Registers: Angular Comparison of Correlation Coef. & Other Statistics

Fig. 5

Identical Image from Expansions about Different Origins:



Symmetry Expanded Direct Space Basis Functions:

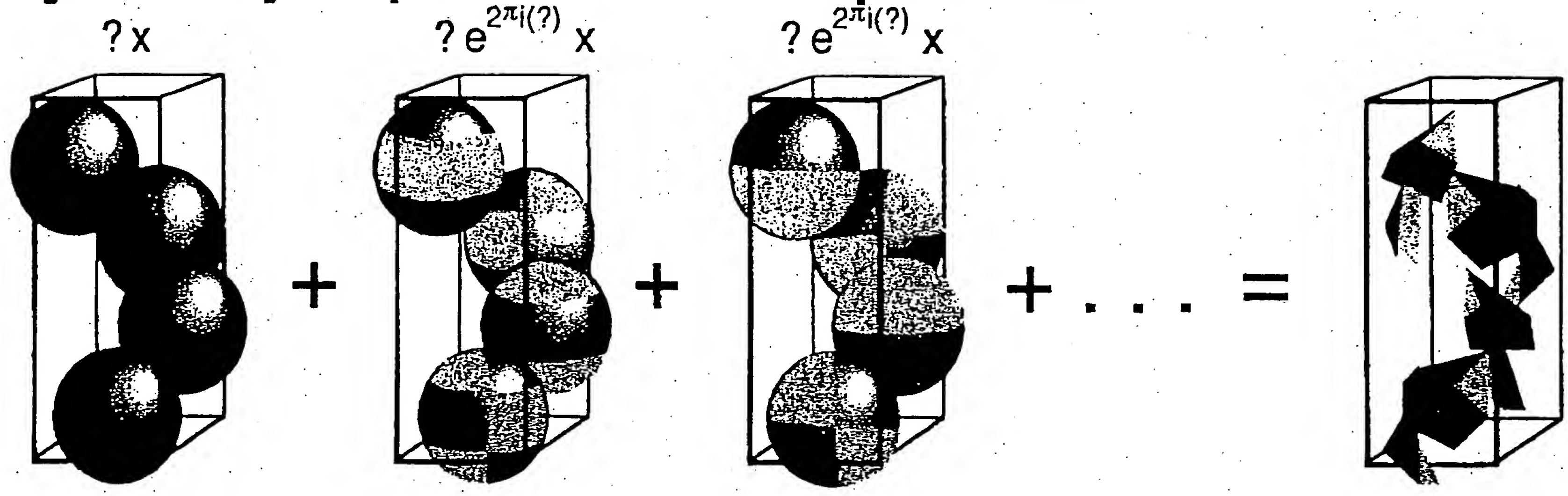
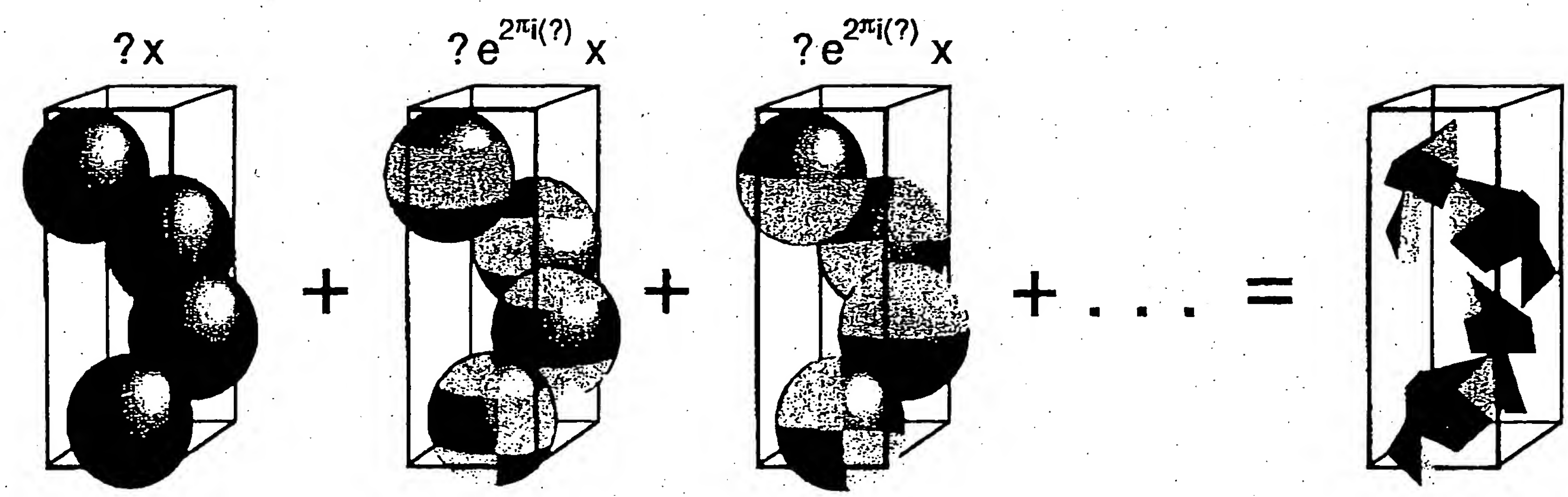


Fig. 6

With a properly chosen origin, 45-55% of the unit cell can be expanded. (Most protein crystals are > 45% solvent.)

Component Direct Space Basis Functions:



Component Fourier Transforms:

$$a_{001}F_{solo}^{001}(hkl) + a_{211}F_{solo}^{211}(hkl) + a_{111}F_{solo}^{111}(hkl) + \ldots = F_{obs}(hkl)$$

$$a_{001} = \Sigma_{hkl}\, F^*{}_{solo}^{001}(hkl)\, F_{obs}(hkl) \quad [\text{presume } \phi = 0.00 \text{ to start}]$$

$$F_{accum}(hkl) = a_{001}F_{solo}^{001}(hkl)$$

$$a_{211} = \Sigma_{hkl}\, F^*{}_{solo}^{211}(hkl)\, (|F_{obs}(hkl)| - |F^{n}_{accum}(hkl)|)\, e^{2\pi i\, \phi^{n}_{accum}(hkl)}$$

$$F^{n+1}_{accum}(hkl) = F^{n}_{accum}(hkl) + a_{211}F_{solo}^{211}(hkl)$$

Fig. 7